

On the 26th Bermuda was near the center of a low that developed into a severe disturbance as shown on Charts X and XI for the 27th and 28th, respectively.

NOTES.—Canadian steamship *City of Vancouver*, Capt. M. Buchanan; Observer, W. A. Kent; from Antwerp to Canal Zone; Feb. 4, 1.45 A. T. S. in 14° 52' N., 72° 44' W. Sea appeared to have on a fine layer of dust with occasional irregular lines of what appeared to be yellow sand. These stretched approximately in a north and south direction and extended as far as could be seen on both sides. These conditions continued until about 3 p. m. in 14° 45' N., 72° 53' W. Course, S. 52° W.; wind W. S. W., 2; sea slight; swell, easterly, slight; barometer, 29.94 inches; thermometer, 83°; sea temperature, 79.5°.

Mr. C. Desmond, second officer and observer, Honduran steamship *Cuyamapa*, Capt. N. Christiansen, reports as follows:

At 19.55 G. M. T. I observed an exceptionally large waterspout several hundred feet high in latitude 30° 58' N., longitude 77° 18' W.

It formed very quietly, no confusion or vapor in vicinity except in itself. It ascended in a straight line, or nearly so, towards the sky to a great height. When heavy dark blue sky lowered in a cone-shape form until it met the ascending water or vapor.

In the center of the globular-shaped moisture, a very light tube formed and continued for 20 minutes. Then it separated at an altitude of a thousand feet, lowered to approximately 500 feet, and took the form of a burning mountain.

With great force these fumes took altitude. The spout, later losing its energy turned to a whirlwind of great interest, about 5 to 10 feet above the surface.

Later heavy showers of rain fell; the wind increased to force 5, veering to the west and northwest, that had been southerly. Barometer, 29.58; air, 66° F.; surface temperature of sea water 71°.

### OCEAN GALES AND STORMS, FEBRUARY, 1931

| Vessel                        | Voyage              |                | Position at time of lowest barometer |           | Gale began | Time of lowest barometer | Gale ended | Lowest barometer | Direction of wind when gale began | Direction and force of wind at time of lowest barometer | Direction of wind when gale ended | Highest force of wind and direction | Shifts of wind near time of lowest barometer |
|-------------------------------|---------------------|----------------|--------------------------------------|-----------|------------|--------------------------|------------|------------------|-----------------------------------|---|-----------------------------------|-------------------------------------|--|
|                               | From—               | To—            | Latitude                             | Longitude |            |                          |            |                  |                                   |   |                                   |                                     |  |
| NORTH ATLANTIC OCEAN          |                     |                |                                      |           |            |                          |            |                  |                                   |   |                                   |                                     |  |
| Frederik VIII, Dan. S. S.     | Oslo                | Halifax        | 56 35 N                              | 28 20 W   | Feb. 2     | Mdt, 2                   | Feb. 4     | 29.47            | SSE                               | SSE, 8  | WSW                               | WSW, 10                             | SSE-S-SSW                                    |
| Milwaukee, Ger. M. S.         | New York            | Galway         | 49 45 N                              | 30 00 W   | Feb. 3     | 10 p, 4                  | Feb. 5     | 29.47            | E                                 | SSW, 10   | NW                                | WNW, 11                             | E-S-W-NW.                                    |
| Carlholm, Swed. S. S.         | Fair Island Strait. | Boston         | 57 59 N                              | 22 24 W   | Feb. 4     | 7 a, 5                   | do         | 29.19            | W                                 | SSW, 6  | WSW                               | WSW, 12                             | SE-SW-N.                                     |
| Ala, Am. S. S.                | Antwerp             | New York       | 39 14 N                              | 55 50 W   | Feb. 5     | 1 p, 6                   | Feb. 6     | 29.59            | S                                 | SSW, 8  | NW                                | S, 9                                | S-W-NW.                                      |
| Sinaia, Fr. S. S.             | Gibraltar           | Providence     | 39 00 N                              | 42 05 W   | do         | —, 7                     | Feb. 8     | 29.60            | SW                                | Calm  | NNE                               | SSW, 10                             | do   |
| Carlholm, Sweden.             | Fair Island Strait. | Boston         | 54 20 N                              | 36 08 W   | Feb. 8     | 8 a, 8                   | do         | 28.70            | WSW                               | WSW, 11   | W                                 | WSW, 12                             | SW-W-NW.                                     |
| Jean Jadot, Belg. S. S.       | New York            | Antwerp        | 41 05 N                              | 50 28 W   | do         | 3 a, 8                   | Feb. 9     | 29.96            | NW                                | NW, 9   | NW                                | NW, 10                              | do   |
| Sagaporack, Am. S.S.          | Norway              | New port News. | 58 28 N                              | 19 17 W   | do         | Noon, 8                  | do         | 28.88            | SW                                | SW, 8   | SW                                | —, 10                               | SW-WSW.                                      |
| Santa Marta, Am. S. S.        | Canal Zone          | New York       | 33 11 N                              | 74 30 W   | Feb. 9     | 4 a, 10                  | Feb. 10    | 29.66            | WNW                               | WNW, 9  | NW                                | —, 9                                | W-WNW-NW                                     |
| Boston City, Br. S. S.        | New York            | Cardiff        | 51 22 N                              | 3 20 W    | Feb. 10    | 8 p, 12                  | Feb. 15    | 29.65            | W                                 | NW, 5   | NW                                | WNW, 10                             | Steady.                                      |
| United States, Dan. S. S.     | Oslo                | Halifax        | 58 08 N                              | 16 30 W   | Feb. 14    | 2 p, 15                  | Feb. 16    | 29.38            | SSW                               | NW, 9   | N                                 | WNW, 10                             | SW-W-NW.                                     |
| Carplaka, Am. S. S.           | Gothenburg          | Portland, Me.  | 58 38 N                              | 6 53 W    | Feb. 15    | 4 a, 16                  | Feb. 17    | 28.97            | W                                 | W, 5  | N                                 | N, 10                               | W-N.   |
| Asia, Dan. M. S.              | St. Thomas          | Hamburg        | 33 40 N                              | 41 30 W   | Feb. 17    | Noon, 17                 | Feb. 20    | 30.02            | SSE                               | SSE, 8  | S                                 | SSE, 11                             | S-SSE-SSW.                                   |
| Carplaka, Am. S. S.           | Gothenburg          | Portland, Me.  | 57 19 N                              | 26 30 W   | Feb. 18    | 8 p, 19                  | do         | 29.25            | W                                 | W, 10   | W                                 | W, 10                               | W-NW.  |
| Liberty, Am. S. S.            | Havre               | New York       | 36 14 N                              | 61 58 W   | Feb. 21    | Mdt, 21                  | Feb. 23    | 28.95            | WNW                               | WNW, 4  | NW                                | NW, 12                              | Steady.                                      |
| Exmouth, Am. S. S.            | Gibraltar           | do             | 36 10 N                              | 53 00 W   | do         | 5 p, 22                  | Feb. 24    | 29.04            | S                                 | WSW, 11   | WNW                               | —, 11                               | S-SW.  |
| West Hika, Am. S. S.          | Hamburg             | Gulfport       | 30 58 N                              | 62 55 W   | do         | Noon, 26                 | Feb. 27    | 29.17            | W                                 | W, 8  | NNW                               | NW, 11                              | do   |
| Cabo Espartel, Span. S. S.    | Seville             | New York       | 35 20 N                              | 51 30 W   | Feb. 27    | 1 a, 27                  | Mar. 1     | 28.89            | WSW                               | WSW, 6  | WNW                               | NW, 10                              | do   |
| Singkeep, Du. S. S.           | Oran                | Boston         | 37 04 N                              | 44 00 W   | Feb. 28    | 7 p, 27                  | Feb. 28    | 29.05            | SSE                               | SW, 10  | W                                 | —, 11                               | SW-W.  |
| Wyneric, Br. S. S.            | Curacao             | Liverpool      | 38 27 N                              | 40 35 W   | do         | 3 a, 28                  | do         | 29.45            | SE                                | SSW, 10   | WSW                               | SE, 11                              | SSE-S-SW.                                    |
| President Harrison, Am. S. S. | Gibraltar           | New York       | 42 55 N                              | 50 15 W   | Feb. 28    | 1 a, 28                  | Mar. 2     | 28.83            | WNW                               | WNW, 8  | NW                                | NW, 12                              | do   |
| NORTH PACIFIC OCEAN           |                     |                |                                      |           |            |                          |            |                  |                                   |   |                                   |                                     |  |
| Michigan, Am. S. S.           | Shanghai            | San Francisco  | 48 00 N                              | 171 15 E  | Jan. 31    | Noon, 31                 | Feb. 1     | 28.03            | ENE                               | SSW, 5  | W                                 | WSW, 9                              | SSE-S-SSW.                                   |
| Arizona Maru, Jap. S. S.      | Seattle             | Yokohama       | 52 07 N                              | 154 42 W  | Feb. 1     | 4 a, 2                   | Feb. 2     | 29.17            | SSW                               | SSW, 9  | SW                                | SSW, 9                              | SSW-S-SW.                                    |
| Hakutatsu Maru, Jap. S. S.    | Milke               | San Pedro      | 45 25 N                              | 158 20 E  | do         | 5 a, 3                   | Feb. 4     | 29.22            | S                                 | SE, 8   | SW                                | NW, 11                              | SE-SW.                                       |
| Do                            | do                  | do             | 48 53 N                              | 176 15 W  | Feb. 7     | 10 a, 7                  | Feb. 8     | 28.82            | SSE                               | SSW, 8  | SW                                | WSW, 11                             | SSW-SW.                                      |
| Laurel, Swed. M. S.           | Port Adelaide       | San Francisco  | 31 37 N                              | 131 50 W  | Feb. 1     | —, 3                     | Feb. 6     | 29.74            | N                                 | N, 10   | NNW                               | N, 11                               | N-NNW.                                       |
| William Penn, Am. M. S.       | Hilo                | San Pedro      | 33 56 N                              | 153 20 W  | Feb. 2     | 3 p, 2                   | Feb. 2     | 29.66            | SSE                               | SSE, 10   | S                                 | S, 10                               | SSE-S.                                       |
| San Diego Maru, Jap. M. S.    | Kudamatsu           | Los Angeles    | 37 10 N                              | 157 05 E  | do         | 4 p, 2                   | do         | 29.40            | E                                 | E, 9  | E                                 | E, 9                                | SSE-E.                                       |
| San Luis Maru, Jap. M. S.     | Elwood              | Kudamatsu      | 30 02 N                              | 179 50 W  | do         | 8 p, 2                   | Feb. 3     | 29.31            | S                                 | SW, 7   | WNW                               | W, 9                                | S-SW-W.                                      |
| Bessemer City, Am. S.S.       | Mobile              | Los Angeles    | 14 04 N                              | 96 15 W   | Feb. 3     | 4 p, 4                   | Feb. 4     | 29.95            | N                                 | ENE, 9  | ENE                               | N, 11                               | NE-ENE.                                      |
| Ryujin Maru, Jap. S. S.       | Vancouver           | Shanghai       | 53 05 N                              | 157 15 W  | Feb. 2     | 2 a, 2                   | Feb. 2     | 28.86            | S                                 | SSW, 9  | SW                                | SSW, 9                              | S-SW.  |
| Do                            | do                  | do             | 50 28 N                              | 174 55 E  | Feb. 8     | 11 a, 8                  | Feb. 8     | 28.82            | NE                                | NNW, 9  | NW                                | NNW, 9                              | NE-WNW.                                      |
| Ryoyo Maru, Jap. M. S.        | Yokohama            | San Francisco  | 47 25 N                              | 152 10 W  | Feb. 4     | 4 a, 5                   | Feb. 5     | 29.11            | ESE                               | ESE   | SSW                               | S, 9                                | do   |
| Kinal Maru, Jap. M. S.        | do                  | Los Angeles    | 30 34 N                              | 164 00 W  | Feb. 7     | 8 a, 9                   | Feb. 9     | 28.97            | NE                                | W, 9  | W                                 | W, 9                                | NW-W.  |
| Pres. Wilson, Am. S. S.       | Honolulu            | Kobe           | 30 34 N                              | 143 45 E  | Feb. 10    | 5 p, 10                  | Feb. 10    | 29.69            | SE                                | SW, 9   | NW                                | SW, 9                               | SW-W-NW.                                     |
| Havana Maru, Jap. S. S.       | Otaru               | San Francisco  | 49 11 N                              | 171 35 W  | Feb. 12    | 10 p, 12                 | Feb. 14    | 28.44            | SE                                | SSW, 9  | WSW                               | SW, 10                              | S-SSW-SW.                                    |
| Forbesbank, Br. M. S.         | San Pedro           | Yokohama       | 32 43 N                              | 176 18 W  | Feb. 15    | 11 a, 16                 | Feb. 16    | 29.74            | SSW                               | SW, 8   | WNW                               | SW, 9                               | WSW-SW-W.                                    |
| Mojave, Am. S. S.             | Yokohama            | San Pedro      | 39 32 N                              | 174 30 E  | Feb. 16    | 1 a, 18                  | Feb. 19    | 29.21            | NW                                | S, 10   | W                                 | S, 10                               | 4 points.                                    |
| Tyndareus, Br. S. S.          | do                  | Victoria       | 49 40 N                              | 163 55 W  | Feb. 17    | 10 a, 18                 | Feb. 20    | 28.07            | SE                                | WSW, 9  | W                                 | SW, 9                               | S-WSW-W.                                     |
| Forbesbank, Br. M. S.         | San Pedro           | Yokohama       | 82 23 N                              | 165 51 E  | Feb. 18    | 2 p, 19                  | Feb. 19    | 29.59            | SW                                | SW, 8   | W                                 | WSW, 9                              | SW-WSW.                                      |
| Hakushika Maru, Jap. S. S.    | Mobile              | Coos Bay       | 31 54 N                              | 119 28 W  | Feb. 19    | Mdt, 20                  | Feb. 21    | 29.98            | NW                                | WNW, 9  | NNW                               | WNW, 9                              | Steady.                                      |
| Do                            | do                  | do             | 38 50 N                              | 124 40 W  | Feb. 23    | 2 p, 23                  | Feb. 24    | 30.03            | NNW                               | NNW   | N                                 | NNW, 9                              | Do.  |
| Fukuyo Maru, Jap. S. S.       | Japan               | Vancouver      | 49 37 N                              | 178 03 E  | Feb. 22    | 5 a, 23                  | do         | 29.49            | ESE                               | NW, 3   | W                                 | W, 11                               | do   |
| Batoe, Du. S. S.              | Soerabaia           | Portland       | 43 23 N                              | 156 20 W  | Feb. 24    | 8 p, 24                  | Feb. 25    | 29.66            | S                                 | SW, 8   | WNW                               | W, 10                               | S-SW-WNW.                                    |
| Golden Sun, Am. S. S.         | Otaru               | San Francisco  | 45 17 N                              | 168 55 E  | Feb. 25    | 8 p, 25                  | Feb. 27    | 29.34            | ESE                               | SSE, 7  | N                                 | SE, 10                              | SE-W.  |

### NORTH PACIFIC OCEAN

By WILLIS E. HURD

**Atmospheric pressure.**—Over the eastern half of the North Pacific Ocean, except the southeastern part, particularly along the California coast, atmospheric pressure rose in February, following the extraordinarily low barometer covering the upper waters during Janu-

ary, although still below the normal from Juneau westward into the Aleutians. The Aleutian cyclone, central in January near Dutch Harbor, fluctuated to the eastward in February, with an average near-central pressure of 29.23 inches at Kodiak. In this general region the cyclonic activity was greatest and the pressure lowest during the early half of the month.

The North Pacific anticyclone was especially well developed in midocean throughout February. Between California and the Hawaiian Islands cyclonic disturbances related to the northern low system prevailed during the first 14 days, but thereafter the anticyclone remained unbroken to the coast by intruding depressions. In Asiatic waters conditions were less stable, several HIGH and LOWS succeeding each other, coming from the continent.

The following table gives barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean.

TABLE 1.—Averages, departures and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, February, 1931

| Stations                    | Average pressure | Departure from normal | Highest | Date | Date   | Date  |
|-----------------------------|------------------|-----------------------|---------|------|--------|-------|
|                             | Inches           | Inch                  | Inches  |      | Inches |       |
| Point Barrow <sup>1</sup>   | 30.08            | -0.04                 | 30.56   | 7th  | 29.74  | 1st.  |
| Dutch Harbor <sup>1</sup>   | 29.36            | -0.24                 | 30.20   | 22d  | 28.48  | 14th. |
| St. Paul <sup>1</sup>       | 29.48            | -0.17                 | 29.98   | 22d  | 28.76  | 9th.  |
| Kodiak <sup>1</sup>         | 29.23            | -0.39                 | 29.78   | 23d  | 28.44  | 11th. |
| Midway Island <sup>1</sup>  | 30.10            | +0.11                 | 30.28   | 24th | 29.76  | 1st.  |
| Honolulu <sup>1</sup>       | 30.13            | +0.03                 | 30.23   | 14th | 29.99  | 2d.   |
| Juneau <sup>1</sup>         | 29.69            | -0.23                 | 30.29   | 2d.  | 29.10  | 18th. |
| Tatoosh Island <sup>1</sup> | 30.00            | +0.02                 | 30.48   | 23d  | 29.37  | 16th. |
| San Francisco <sup>1</sup>  | 30.01            | -0.06                 | 30.27   | 18th | 29.56  | 12th. |
| San Diego <sup>1</sup>      | 29.96            | -0.08                 | 30.22   | 18th | 29.56  | 12th. |

<sup>1</sup> P. m. observations only.

<sup>2</sup> For 27 days.

<sup>3</sup> A. m. and p. m. observations.

<sup>4</sup> Corrected to 24-hour mean.

**Cyclones and gales.**—Conditions of wind and weather on the Pacific were far less intense than in January, and general storm activity was less widespread. Of the traveling cyclones from Asiatic waters, none was of great importance. A moderately deep storm caused a north-westerly gale of force 11 southeast of the Kurils on the 3d, and fresh to strong gales were noted on a few days east of Japan in connection with some rather shallow and brief-lived disturbances.

In upper waters south and southeast of the Aleutians gales of force 8 to 10 occurred on about 20 days, irregularly distributed, and many of them purely local in character. They were most frequent along that part of the northern routes lying southwest of the Gulf of Alaska, in the region most frequented this month by the Aleutian disturbance. However, the heaviest winds, westerly gales of force 11, in northern waters occurred south of the central Aleutians, one on the 8th, at which time the cyclone was of considerable depth, and the other on the 23d, with the barometer only moderately depressed.

During the early half of February two cyclones, separated from the lower extensions of the Aleutian cyclone, developed, though to no great depth, to the westward of California. The former gathered on the 1st and entered the coast on the 5th. The latter was disconnected from the upper disturbance on the 7th and was reunited with it on the 13th or 14th. Its highest reported winds were of force 8. The earlier was the severer, as may be indicated particularly by the report of the Swedish motor ship *Laurel*, which encountered northerly gales on the 1st, near 25° N., 140° W., and continued in them until near San Francisco on the 6th. On the 3d the maximum

wind had increased to a whole gale, and on the 4th, near 32° N., 132° W., to force 11, thus showing the cyclone to have been rather intense, at least in some localities.

Two severe northers were experienced in the Gulf of Tehuantepec. One on the 4th developed full storm force. During the afternoon of the 25th, and continuing through the night, the motor ship *William Penn*, entering the gulf, encountered fresh to whole northerly gales, with squalls of hurricane force and such "short, vicious seas," that at times she "was literally under water."

The prevailing wind direction at Honolulu was from the east, with a maximum velocity of 29 miles an hour from the same direction on the 24th.

**Fog.**—Fog was more scattered and infrequent than it had been before for many months. At the most, it was reported at some distance off the California coast on four days, and off the coast of Washington and in the vicinity of Midway Island on three days.

#### BUCKET OBSERVATIONS OF SEA-SURFACE TEMPERATURES

By GILES SLOCUM

#### STRAITS OF FLORIDA AND CARIBBEAN SEA

The temperatures herein published are the means of the average temperatures for the four quarters of the month, except that, in the case of the 5° subdivisions of the Caribbean Sea, the figures shown are the simple means of the observed temperatures with the entire month taken as a unit. Table 1 shows the lengths of the quarters for each length of month.

Table 2 shows the mean temperature for the Caribbean Sea and the Straits of Florida for February of each year from 1919 to 1930, inclusive, and Table 3 summarizes the temperature for the month in the same areas, including the departures of the February, 1930, means from the 11-year means for February (1920-1930), and the changes from the temperatures for the preceding month of January, 1930.

The means for 1919 are not used in the computations for comparisons, the poor distribution and the dearth of data for that year making them somewhat unreliable.

The chart shows the number of observations taken during the month of February, 1930, within each 1° square; the mean temperature of the Straits of Florida, and of each 5°<sup>1</sup> subdivision of the Caribbean Sea; the 11-year means (1920-1930) for these areas; and the local mean time corresponding to Greenwich mean noon, at which time the mariners are instructed to make the temperature readings.

TABLE 1.—Lengths of "Quarter-months" used in computing mean sea-surface temperatures

| Length of month | Days of month included in quarter |      |       |       |
|-----------------|-----------------------------------|------|-------|-------|
|                 | I                                 | II   | III   | IV    |
| 28 days         | 1-7                               | 8-14 | 15-21 | 22-28 |
| 29 days         | 1-7                               | 8-14 | 15-21 | 22-29 |
| 30 days         | 1-7                               | 8-15 | 16-22 | 23-30 |
| 31 days         | 1-7                               | 8-15 | 16-23 | 24-31 |

<sup>1</sup> In three cases, indicated on the chart, the observations from small, little traveled, and unimportant areas at the outer limits of the Caribbean Sea have been treated as parts of contiguous 5° subdivisions.